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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,284	12/21/2001	Ling Chen	APPM/5192/02/CPL/COPPER/P	4034

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APPLIED MATERIALS, INC.
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EXAMINER

MOORE, KARLA A

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,284	CHEN ET AL.	
	Examiner	Art Unit	
	Karla Moore	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-105 is/are pending in the application.
- 4a) Of the above claim(s) 23-105 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-22, drawn to a gas delivery assembly, classified in class 156, subclass 345.33.
 - II. Claims 23-62, drawn to a chamber, classified in class 156, subclass 345.29.
 - III. Claims 63-74, drawn to a chamber, classified in class 156, subclass 345.29.
 - IV. Claims 75-80, drawn to a gas delivery assembly, classified in class 156, subclass 345.33.
 - V. Claims 81-105, drawn to a method of depositing a material layer over a substrate structure classified in class 427.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination fails to recite one or more gas conduits coupled to an expanding channel, wherein the one or more gas conduits are positioned at an angle from a center of the expanding channel. The subcombination has separate utility such as in a combination where the gas delivery assembly is not positioned proximate the chamber lid.

3. Inventions III and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because one or more gas conduits coupled to the expanding channel, wherein the one or more gas conduits are positioned at an angle from a center of the expanding channel. The subcombination has separate utility such as in a combination where the gas delivery assembly is not positioned proximate the chamber lid.

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4. Inventions I and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not recite first and second valves. The subcombination has separate utility such as in a gas delivery assembly without a covering member comprising an expanding channel.

5. Inventions V and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus, such as one without a covering member comprising an expanding channel.

6. Inventions III and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination as claimed does not require the particulars of the subcombination as claimed because one or more gas conduits coupled to the expanding channel, wherein the one or more gas conduits are positioned at an angle from a center of the expanding channel. The subcombination has separate utility by itself.

7. Inventions II and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not

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recite first and second valves. The subcombination has separate utility such as in a gas delivery assembly without a chamber lid comprising an passageway at a central portion of the chamber lid.

8. Inventions V and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus, such as one without a chamber lid comprising a passageway at a central portion of the chamber lid.

9. Inventions III and IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not recite first and second valves. The subcombination has separate utility such as in a gas delivery assembly without a chamber lid comprising an expanding channel.

10. Inventions V and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus, such as one without a chamber lid comprising an expanding channel extending from a central portion of the chamber lid.

11. Inventions V and IV are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another materially different apparatus, such as one without first and second valves each comprising a delivery line and a purge line

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12. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification or because different searches are required, restriction for examination purposes as indicated is proper.

13. During a telephone conversation with Mr. Robb Edmonds on 8/21/03 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-22. Affirmation of this election must be made by applicant in replying to this Office action. Claims 23-105 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

14. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1-3, 6-8, 10, 18-19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,338,363 to Kawata et al.

17. Kawata et al. disclose a gas delivery assembly in Figure 1, comprising: a covering member (2) comprising an expanding channel (inside volume of 17) at a central portion of the covering member and comprising a bottom surface extending from the expanding channel to a peripheral portion of the covering member; and one or more gas conduits (18a/b) coupled to the expanding channel, wherein the one or more gas conduits are positioned at an angle (90°) from the center of the expanding channel.

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18. With respect to claim 2, the one or more gas conduits (18a/b) are disposed normal to a longitudinal axis of the expanding channel (see Figure 1).
19. With respect to claim 3, the one or more gas conduits (18a/b) are disposed at an angle (90°) to a longitudinal axis of the expanding channel (see Figure 1).
20. With respect to claim 6, the one or more gas conduits are disposed along the length of the expanding channel (see Figure 1).
21. With respect to claim 7, the one or more gas conduits are disposed at the same length around the expanding channel (see Figure 1).
22. With respect to claim 8, the one or more gas conduits are equally spaced out around the perimeter of the expanding channel (see Figure 1).
23. With respect to claim 10, the one or more gas conduits are positioned toward the same circular direction (see Figure 1).
24. With respect to claim 18, the bottom surface is substantially flat (see Figure 1).
25. With respect to claim 19, a gas source (19a/b) is coupled to each conduit (see Figure 1).
26. With respect to claim 21, a separate reactant sources are coupled to each gas conduit (see Figure 1).
27. Claims 1, 3-5, 9, 11-14, 18-19 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,179,920 to Tarutani et al.
28. Tarutani et al. disclose a gas delivery assembly in Figure 1, comprising: a covering member (lid portion of reactor 3) comprising an expanding channel (inside conical volume) at a central portion of the covering member and comprising a bottom surface extending from the expanding channel to a peripheral portion of the covering member; and one or more gas conduits (1 and 2) coupled to the expanding channel, wherein the one or more gas conduits are positioned at an angle (0°) from the center of the expanding channel.
29. With respect to claim 3, the one or more gas conduits (1 and 2) are disposed at an angle (0°) to a longitudinal axis of the expanding channel (see Figure 1).

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30. With respect to claims 4 and 5, the one or more gas conduits (1 and 2) are angled upwardly/downwardly (see Figure 1).
31. With respect to claim 9, the one or more gas conduits are disposed at an upper portion of the expanding channel (see Figure 1).
32. With respect to claim 11, the expanding channel comprises a tapered surface extending from the central portion of the covering member (see Figure 1).
33. With respect to claim 12, the tapered surface of the expanding channel comprises a surface selected from the group consisting of a straight surface, a concave surface, a convex surface, or combinations thereof.
34. With respect to claim 13, the expanding channel is shaped as a truncated cone (see Figure 1).
35. With respect to claim 14, the expanding channel comprises an upper portion and a lower portion, the upper portion having a smaller inner diameter than the lower portion (see Figure 1).
36. With respect to claim 18, the bottom surface is substantially flat (see Figure 1).
37. With respect to claim 19, a gas source is coupled to each conduit (column 7, rows 4-7).
38. With respect to claim 21, a separate reactant sources are coupled to each gas conduit (column 7, rows 4-7).

Claim Rejections - 35 USC § 103

39. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

40. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of

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each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

41. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tarutani et al. as applied to claims 1, 3-5, 9, 11-14, 18-19 and 21 above, and further in view of U.S. Patent No. 6,334,983 to Okayama et al.

42. Tarutani et al. disclose the invention substantially as claimed and as described above.

43. However, Tarutani et al. fail to teach the bottom surface comprises a tapered surface.

44. Okayama et al. teach tapering a surface adjacent to a processing chamber so that an edge is not formed, which results in improved plasma resistance and uniform gas distribution over a workpiece placed in the processing chamber (column 3, row 66 through column 4, row 100).

45. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a tapered bottom surface in Tarutani et al. in order to achieve improved plasma resistance and uniform gas distribution over a workpiece placed in the processing chamber as taught by Okayama et al.

46. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tarutani et al. as applied to claims 1, 3-5, 9, 11-14, 18-19 and 21 above, and further in view of U.S. Patent No. 4,907,534 to Huang et al.

47. Tarutani et al. disclose the invention substantially as claimed and as described above.

48. However, Tarutani et al. fail to teach a common purge gas source coupled to each gas conduit.

49. Huang et al. teach an arrangement which includes coupling a common conduit, capable of supplying a purge gas, to gas conduits for the purpose of ensuring that the suitability of the reactor for multiple process gases and dopants for compound semiconductor materials such as quaternary or even more complex materials (column 2, rows 39-58).

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50. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an arrangement which includes coupling a common conduit, capable of supplying a purge gas, to each of the gas conduits in Tarutani et al. in order to ensure the suitability of the reactor for multiple process gases and dopants for compound semiconductor materials such as quaternary or even more complex materials as taught by Huang et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km


GREGORY MILLS
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